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# Introduction. One name for many things

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## 1. **Asset Management is about money, risk and performance**

Asset Management is the art and science of getting the relationships right between money, risk and performance in businesses that depend on physical assets for their success. Get the relationships right and the business is more likely to produce the outcomes shareholders expect in the most cost-effective way. For asset-dependent businesses, many of which are state-owned utilities and transport providers, shareholders may include governments and taxpayers as well as private and institutional investors. There is also a wide range of stakeholders, including customers, regulators, lawmakers, local communities, lobby groups, workers, the public and the media, which exert influence on how asset-dependent businesses operate and how value is perceived.

There are two main perspectives on the purpose and scope of Asset Management: a business-led one, the purpose of which is to ‘strike a balance between cost and risk, as well as performance, to create value for shareholders and stakeholders’, as Anthony Vaughan puts it in Chapter 11; and a more technical one, which views it as a proactive, life cycle approach to reducing build, operation and maintenance costs and risks. In practice, good Asset Management must draw together these two perspectives in a seamless approach. To steal a phrase from the French mathematician Henri Poincaré, Asset Management *is the art of giving the same name to different things*.

Asset management principles, logic, techniques and methods inject confidence, transparency and accountability into financial forecasts, investment decisions and business performance, regardless of what tools or technologies are used to enable this. It is holistic, integrative and involves looking forwards and backwards, outwards and inwards, upwards and downwards, adapting continually to new opportunities and threats, and mediating shareholder and stakeholder needs over the long-term.

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## Chapter 1

# Asset Management – the first 20 years

### Richard Edwards

Director, AMCL and Past President of the Institute of Asset Management

This chapter introduces Asset Management and explains why it is different from traditional ways of managing asset-intensive businesses. It describes what Asset Management is and the drivers that have been instrumental in advancing the discipline. It discusses the implementation of Asset Management, with reference to its six main areas and some of the key techniques within these, giving examples from organisations around the world. It concludes with a shortlist of future challenges and how these can be overcome.

## 1. Introduction

Asset Management is defined in ISO 55 000 as ‘*the coordinated activities of an organisation to realise value from assets*’ (ISO, 2014a). This is a very useful definition as it draws out two of the most important concepts in Asset Management.

- (a) Firstly, the concept of ‘*coordinated activities*’ means that an organisation must align its activities – both horizontally (across departments) and vertically (from the boardroom to the operations) – in a coordinated way.
- (b) Secondly, the definition reinforces the notion that Asset Management is not just the management of assets, but is about the purpose of having assets – i.e. what value the assets deliver to stakeholders.

There are many other definitions of Asset Management but essentially Asset Management allows asset-intensive businesses to use limited resources to achieve their stated business objectives in the most cost-effective way. It combines engineering and mathematical analyses with sound business practice and economic theory.

Asset Management includes a range of technical, human and organisational capabilities. These are discussed in detail in Section 3.

### 3. Maturity

#### 3.1 Maturity scale

To avoid the risk of creating a compliance culture and engage asset owners fully in the development of their asset management capabilities, it is essential that the method for determining asset management capability is transparent to all stakeholders, so that they can understand and buy into it.

To enable a business to answer the vital questions ‘How good are we?’ and ‘How good do we want to be?’, a maturity scale is needed, where each point, or state, on the scale is described in terms of the typical characteristics of an organisation that is operating in that state. An example maturity scale is shown in Figure 2.4. The states of this particular scale range from ‘innocent’ to ‘excellent’.

Gathering the evidence needed from a number of sources to produce valid and reliable assessments of the current and desired future state is not a minor undertaking. A simple way to build enthusiasm and support for this is to have key stakeholder groups discuss and agree where they think the business is now, using the maturity scale, and then present the overall findings to them.

Figure 2.4 Example maturity scale (Reproduced by permission of AMCL)

The maturity scale has six maturity states as follows:

|   |                   |   |
|---|-------------------|---|
| 0 | <i>Innocent</i>   | The organisation is starting to <i>learn</i> about the importance of asset management activities  |
| 1 | <i>Aware</i>      | The organisation is aware of the importance of the asset management activities and has started to <i>apply</i> this knowledge                             |
| 2 | <i>Developing</i> | The organisation is developing its asset management activities and <i>embedding</i> them  |
| 3 | <i>Competent</i>  | The organisation's asset management activities are developed, <i>embedded</i> and are becoming effective  |
| 4 | <i>Effective</i>  | The organisation's asset management activities are fully effective and are being <i>integrated</i> throughout the business                                |
| 5 | <i>Excellent</i>  | The organisation's asset management activities are fully <i>integrated</i> and are being continuously improved to deliver <i>optimal</i> whole-life value |

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## Chapter 3

# Research challenges in Asset Management

**Ajith Kumar Parlikad**

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The aim of this chapter is to provide an outline of the key focus areas of research carried out in the academic community and the direction of research that lies ahead.

### **1. Introduction: Asset Management as a 'discipline'**

This section explores the academic landscape of Asset Management and argues the need for more visibility and recognition to be given to this ever-important subject. The journey has begun, but a lot more needs to be done to highlight the challenging nature of problems and the multidisciplinary approach needed to address them.

Research in Asset Management has, historically, been carried out within more traditional disciplines, such as reliability engineering and maintenance management. Other domains, such as cost engineering, human resource management, organisational behaviour and performance measurement, are slowly being examined and the findings brought to bear on Asset Management. The most authoritative repository of knowledge lies in the myriad of academic journals that fall under four major categories (note that this is not meant to be an exhaustive categorisation of journals).

*Generalist journals* such as the *European Journal of Operational Research*, *Management Science* and *Computers in Industry* offer an outlet for research that focuses on fundamental contributions to a more general discipline. Research published in such journals has widespread applications, including, but not limited to, Asset Management.

*Subject-specific journals* such as *Reliability Engineering & System Safety*, the *IEEE Transactions on Reliability*, the *Journal of Quality in Maintenance Engineering* and *Risk Analysis* publish high-quality articles that are generally quantitative and propose innovative ways to model reliability and degradation and optimise asset management decisions. They are normally domain-agnostic and consider most problems from a systems perspective.

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## Chapter 5

# Building an Asset Management Competence Framework for your business

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The experiences of early adopters of Asset Management suggest (GAO, 2018; Lloyd, 2011) that knowledge and skills, attitudes and perspectives – in the boardroom, the workplace and the supply chain – may well be more decisive than standards, information systems and process changes in delivering its game-changing potential. This challenge lies outside the experience and authority of most executives and senior managers leading Asset Management in their organisations. And it is a challenge that grows more urgent because of public and investor pressures for expanded and better services that make best use of finite financial and natural resources.

This chapter describes how an Asset Management Competence Framework (AMCF) can be used to understand the current asset management capability in the workforce, define what it needs to look like in future and outline the approach that will be taken to getting there. It draws on our experience of helping businesses around the world devise ways of managing workforce competence tailored to their Asset Management Strategies and Systems.

### 1. Introduction

The IAM Competences Framework (IAM, 2014) is the key reference for organisations designing and developing their asset management workforces. It underpins the IAM Professional Development Framework, known as ‘Vision 2026’, which encompasses the IAM foundation award, certificate and diploma qualifications, IAM recognition of third-party qualifications and company schemes, and the global register of professionals the IAM is now establishing. It is also aligned to the requirements of ISO 55 001 and to the 39 subjects that underpin the IAM conceptual model of Asset Management (IAM, 2015), so it makes sense for organisations seeking ISO 55 001 certification to use it to

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## Chapter 8

# Infrastructure Asset Management in the age of smart cities

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Historically, infrastructure sectors, such as water, energy and transportation, have been slow to adopt innovative ways of managing assets. Recently, however, the convergence of digital technologies and physical assets has given rise to the possibility of intelligent assets, digital Asset Management and smart infrastructure, with the potential to fundamentally change the face of Asset Management in this new age of ‘smart cities’. This chapter introduces some key technological, economic and management principles behind smart cities, and the intelligent assets and smart infrastructure which will be required to support them. It explores innovations that will change asset management practice as smart cities come to life but warns that unless Asset Management professionals engage fully, they could find themselves on the sidelines.

### 1. Introduction: challenges and opportunities for infrastructure Asset Management

An unprecedented 6.8 billion people are expected to live in cities by 2050. This will significantly increase the demand for the basic water, energy, transportation and waste management services necessary to sustain human activities. ‘As cities around the world experience this exploding growth, the need to ensure they can expand sustainably, operate efficiently and maintain a high quality of life for residents becomes even greater’ (UNESCO, 2016). Cities are under constant pressure to provide quality services, promote economic competitiveness, increase efficiency and reduce costs, increase productivity, and address congestion and environmental issues.

In addition, climate change poses a series of unprecedented challenges to cities, much of which strikes aging infrastructure already in need of repair or replacement. Increasingly, essential infrastructure systems, such as water, energy supply and transportation, will be compromised by the devastating impact of climate change (Ralph Rayner describes this